

Regulatory benefits huge but imprecise

The net benefits of all federal regulations enacted up to spring 1999 totaled between \$30 billion and \$1.62 trillion, according to a draft study by the White House Office of Management & Budget (OMB).

Most of the huge benefits—and the huge variance—were driven by environmental regulations, which alone had an estimated benefit range of \$1.5 trillion.

This means that net benefits from environmental rules could be as high as \$1.47 trillion after costs are subtracted, or, according to OMB, regulatory costs might actually top benefits by \$78 billion, depending on how the numbers shake out.

Such a negative environmental benefit, however, is quite doubtful, OMB staff says, and is probably due to overlapping ranges from different years. This is the third annual OMB regulatory cost-benefit study. Required by Congress, the report is one of many politicians have called for in the past decade.

The biggest variance in the environmental sector, OMB officials say, was due to calculations involving expected health benefits that are likely to occur in years after a regulation has gone into effect. Those calculations rest on different assumptions about age, longevity, and health impacts concerning an affected individual in a given year. Also of importance are assumptions about the value of a life.

Much of the calculated environmental benefits stems from health improvements attributable to Clean Air Act regulations implemented between 1970 and 1990—benefits driven primarily by ozone and particulate-matter reductions.

Although long-term health implications could also affect the cost-benefit ranges in Labor Department regulations, OMB officials say, its lower numbers, both for costs and benefits, were a result of fewer regulations being implemented by the Occupational Safety & Health Administration in recent years.

The report emphasizes that it may be "difficult, if not impossible, to estimate the actual total costs and benefits of all existing federal regulations with accuracy."

"It is easy to be put off by the wide range of estimates, but there is real value in having both OMB and the regulatory agencies do this," says Paul Portney, an economist and president of Resources for the Future.

"The exercise is especially useful if it induces the agencies to pay close atten-

tion to incremental benefits and costs of proposed regulations. While it is of some interest, mostly political, to know the gross benefits and costs of all regulations, it is not all that helpful because no one is proposing either to keep or do away with them all."

Keith Belton, Chemical

Manufacture policy analyst, reports is better accurate than

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supports ag

but wishes each agency's data consistent.

"Every agency, and even EPA offices, does it differently," he says. The report, he adds, acknowledges this but offers no suggestions to make data consistent.

Belton adds that "little tidbits" in the report are important. For instance, he

Benefits of social regulations show huge variance

Category	Costs	Benefits	Net benefits
Environmental	\$124 to \$175	\$37 to \$1,555	\$-76 to \$1,471
Transportation	15 to 18	84 to 110	69 to 93
Labor	18 to 18	28 to 30	9 to 12
Other	17 to 22	55 to 60	33 to 43
TOTAL	\$174 to \$234	\$334 to \$1,765	\$-50 to \$1,531

Source: Office of Management & Budget. The data do not reflect some benefits that could not be given dollar values. Ranges calculated as lowest benefit minus highest cost to highest benefit minus lowest cost. Source: Office of Management & Budget.

EXHIBIT III

notes that Americans spend \$190 billion per year, 2.3% of the gross domestic product, on federal paperwork, 82% of which is for the Internal Revenue Service.

The final report is expected next month. The draft is on the web at <http://www.whitehouse.gov/omb/inforeg/index.html>.

Jeff Johnson

Better polymers from new, improved catalysts

Nickel-based catalysts, developed by California Institute of Technology chemistry professor Robert H. Grubbs and colleagues, produce high molecular weight polyethylene, can tolerate contaminants, work at low temperatures and pressures, and don't require a cocatalyst. Not only that, but the catalysts can polymerize olefins with functional groups, which could lead to polymers with new properties [*Science*, 287, 460 (2000)].

More than 85 million metric tons of polyolefins are produced each year. Since the 1950s, a good percentage of these have been made using Ziegler-Natta catalysts such as $\text{TiCl}_4/(\text{CH}_3\text{CH}_2)_2\text{AlCl}$.

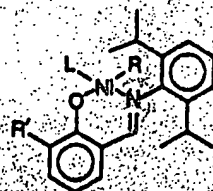
During the past 15 years, however, metallocene catalysts have enjoyed increasing popularity in polyolefin production. Unlike Ziegler-Natta catalysts, metallocenes are very well characterized, offering an unprecedented level of control—chemists are able to tailor the properties of resulting polyolefins very specifically.

However, metallocene catalysts require scrupulously clean conditions to be effective. The electrophilic nature of the cationic early-transition-metal center in these catalysts makes them susceptible to inactivation by organic functional groups and impurities such as oxygen, nitrogen, or sulfur.

Another approach to olefin catalysis involves the use of late-transition-metal complexes, which have less of an affinity for oxygen than metallocenes. The Shell higher olefin process (SHOP) employs a neutral, nickel-based catalyst with a phosphorus-oxygen ligand chelate. The SHOP system can tolerate polar functional groups, but it primarily produces oligomers four to 20 units long and requires high temperatures and pressures.

Numerous researchers are working on surmounting these various problems. The strategy of Grubbs and colleagues was to start with the SHOP catalyst, replacing the PO-based species with one based on the more sterically

New neutral, single-component Ni catalysts



L = triphenylphosphine; R = phenyl; R' = phenyl, 3-phenoxyphenyl, or 3-methoxyphenyl.
L = carboxylate; R = methyl; R' = 3-methoxyphenyl, triphenylmethyl, or isopropenyl.

bulky salicylaldimine—an approach developed by Maurice S. Brookhart, chemistry professor at the University of North Carolina, Chapel Hill.

The Caltech team synthesized a number of variants. They were able to produce polyethylene with a molecular weight of more than 250,000, narrow molecular weight distribution, and very little branching. They were also able to copolymerize ethylene and olefins functionalized with polar groups such as hydroxyl.

"These are exciting results that represent a significant step forward in our understanding of transition-metal olefin polymerization catalysis," says Tobin J. Marks, chemistry and materials science and engineering professor at Northwestern University, Evanston, Ill.

"It's impressive work and has meaningful industrial implications," says John J. Murphy, director of metallocene and single-site catalyst programs at Catalyst Group in Spring House, Pa. However, he says, it's not an unanticipated development. "It's a very logical extension of where the technology is going in industry," he says.

The Grubbs group is continuing to work on its catalyst family. "It will be interesting to see how this area develops as the scope and mechanism are further explored," Marks notes.

Elizabeth Wilson

EPA Issues guidelines on planting Bt corn

The Environmental Protection Agency has issued new guidelines for growing Bt corn—corn that is genetically modified to contain a gene from the soil microorganism *Bacillus thuringiensis*, enabling the corn to produce its own insecticide. The measures are designed to protect against the emergence of insects that are resistant to the Bt toxin and to protect monarch butterfly caterpillars and other nontarget organisms.

Every cell of Bt corn, including the pollen, produces a specific toxin that kills the European corn borer. Last May, John E. Losey, an entomologist at Cornell University, reported lab research that shows that Bt corn pollen can kill monarch butterfly caterpillars [*Nature*, 399, 214 (1999)]. Since May, environmentalists have been demanding that EPA take steps to protect the monarch butterfly from possible harm from Bt corn pollen. Studies to determine whether Bt corn

pollen harms monarchs in the field are so far inconclusive.

In its guidelines, EPA says manufacturers and sellers of Bt corn seed must impose certain contractual requirements on farmers. If manufacturers don't, their products, which are up for reregistration in 2001, won't be reregistered. First, at least 20% of their cornfields must be planted in traditional, non-

insects. "We strongly advise that [seed producers] provide technical assistance to the growers to help place refugia [required plots of non-Bt corn] where they can serve both goals of managing resistance and minimizing nontarget exposure," writes Janet L. Andersen, director of EPA's Biopesticides & Pollution Prevention Division, in a letter to Monsanto, a major producer of Bt corn seed.

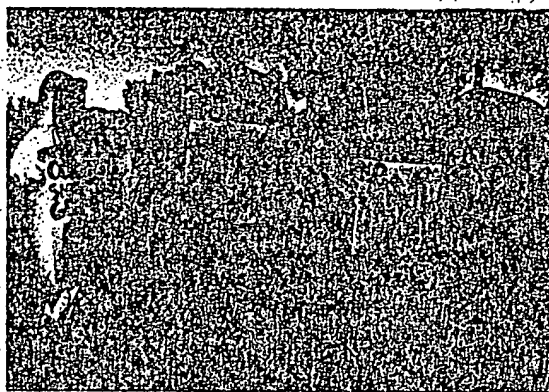
"The measures communicated by the EPA... are nothing new for us or our customers, since most of them were already in place," Monsanto says in a statement. The company has not released any grower contracts that would show exactly what it required of growers last year.

However, Jane Rissler, senior staff scientist at the Union of Concerned Scientists, contends that "these regulations show EPA is taking the resistance matter and the monarch issue

seriously. This shows EPA believes the issue is far from settled."

Rebecca J. Goldberg, senior scientist at the Environmental Defense Fund, says these new requirements may level the playing field for the different types of Bt corn. Previously, recommendations as to the extent of Bt corn refugia varied from 5 to 20% depending on the exact variety of Bt corn, and they were not mandatory, she explains. But, she says, the new guidelines are not strong enough to protect the monarch.

Bette Hileman



EPA's guidelines won't satisfy protesters such as these in Washington, D.C.

Bt corn. Cornfields in cotton-growing areas must contain more—50%—non-Bt corn, because more than half of the cotton grown in the U.S. is Bt modified. In addition, EPA is asking seed producers to ensure that farmers plant some of this traditional corn around the edges of the field or so as to protect monarch caterpillars and other nontarget organisms from exposure to Bt corn pollen.

Furthermore, EPA is demanding that seed producers expand their monitoring activities to provide early warning of any potential resistance to Bt toxin by

Monsanto sued for breach of merger contract

Delta & Pine Land, the leading U.S. cottonseed producer, is suing Monsanto for failing to complete its 19-month-long attempt to buy the company. The Scott, Miss.-based company is seeking at least \$1 billion in compensatory damages as well as punitive damages. The \$1.9 billion deal fell apart the day after Monsanto agreed to merge with Pharmacia & Upjohn (C&EN, Jan. 3, page 7). The deal was terminated, Monsanto says, due to continued delays in U.S. government reviews and burdensome demands by the Department of Justice.

Delta & Pine Land alleges that Monsanto breached its contractual obligations to use "commercially reasonable ef-

forts to respond fully and promptly to all inquiries... and to resolve objections by the Antitrust Division of the Department of Justice in seeking regulatory clearance."

Monsanto calls the allegations "unreasonable and without merit" and says it will defend itself vigorously. It's already paid Delta & Pine Land an \$81 million termination fee under their May 1998 merger agreement (C&EN, Jan. 10, page 8).

"It's disappointing that Delta & Pine Land—a technology partner we've worked with for years—would file this suit when they worked side by side with us in attempting to secure regulatory approval of the merger," Monsanto President Hendrik A. Verfaillie comments.